

15¢

TECHNOLOGY DEPT.

SCIENCE NEWS LETTER

PUBLIC LIBRARY

JAN 11 1946

DETROIT

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JANUARY 5, 1946



Largest Flying Boat

See Page 3

A SCIENCE SERVICE PUBLICATION

Steam Made Crater

Volcanic explosion and not meteorite caused Arizona's famous landmark. Evidence supporting theory is another crater with cinder cone in center.

► ARIZONA'S famous crater, usually referred to as Meteor Crater, was not caused by the impact of an enormous projectile from outer space at all, declared Dr. N. H. Darton of the U. S. Geological Survey before the annual meeting of the Geological Society of America in Pittsburgh. Persistent search for the supposed deeply buried meteorite, on which more than \$1,500,000 has been expended, has merely proved that it isn't there, he told his audience.

Dr. Darton has always believed that this remarkable crater was produced by a volcanic steam explosion. As supporting evidence, he pointed out the facts that it is in a volcanic region, and that a smaller but similar crater, Zuni Salt Lake, 120 miles to the east, has a cinder cone in its center. For this reason, Dr. Darton years ago gave the formation the name Crater Mound, and this name has been officially adopted by the U. S. Board of Geographic Names, thus becoming obligatory for use on all approved maps.

How Ploesti Was Found

► AMERICAN geologists were able to help American fighters on all fronts in their world-wide war, through their detailed knowledge of the terrain and the rock and soil formations that lay under the surface. The importance of military geology was discussed in some detail at the meeting.

Nazi camoufleurs had succeeded in so thoroughly hiding the famous Ploesti oil center in Rumania that our bombers could not find it. Geologists showed them what the surrounding hills and fields looked like, by means of a new kind of map, known as a terrain diagram. By taking their bearings on this picture, our raiders made a second visit—and dropped their calling cards right on the tray.

Prof. L. Dryden of Bryn Mawr College told of some of the other questions American geologists were called upon to answer before raids could be made or beach landings attempted. Where were the best sites for airfields on the Solomon islands? What kind of terrain

would ground forces have to fight over on Madagascar. What camouflage equipment should be taken to Sicily? Quick answers were found for these questions, and many others.

Geologists also helped in getting roads, airfields and other installations built, Prof. C. S. Denny of Connecticut Wesleyan University told his colleagues. If engineers were told in advance whether the soil was soft or rocky, they would know how many bulldozers to take along, and how much dynamite for blasting. Drainage and water supplies were other important matters in which geological knowledge went in along with the first working crews, saving much time and effort.

Hardest Grinding Wheels

► HARDEST grinding wheels in the world, useful in a score of industrial applications, were described before the meeting by C. R. Van Riper of the research laboratories of the Norton Company, well-known makers of abrasives. These are small wheels made of bits of diamond, bonded together with various substances, the hardest of all, and hence the keenest-cutting, being vitrified-bonded.

Such wheels are used for shaping and dressing tools whose very names have themselves become synonyms of harness, like cemented carbide tools, as well as hard gem stones, quartz and other resistant materials. Diamond wheels are also useful for precision work, especially in the production of lenses and small steel parts where dimensional tolerances are small.

Fossil Pollen in Coal

► BACK ON their peacetime jobs, geologists are putting their best efforts into locating and evaluating new sources of ores, minerals and fuels. Robert M. Kosanka of the Illinois Geological Survey told how fossil pollen grains and plant spores, embedded in coal formations for a third of a billion years, are being

studied in the hope of locating new coal beds in the Midwest.

These minute fossils, which can be separated from the coal only by the most painstaking methods, came from the giant fern-like trees and enormous relatives of horsetail rushes that formed the forests of those days and left their remains in the coal seams. Abundance and distribution of pollen grains and spores may serve as guides to coal deposits still awaiting discovery.

Science News Letter, January 5, 1946

SAFETY

Explosion Probably Caused Kentucky Mine Disaster

► MOST PROBABLE cause of the Pineville, Ky., coal mine disaster, which entombed over 30 men, is an explosion of natural gas accumulated over the Christmas holiday, say officials of the U. S. Bureau of Mines.

While there can be no final confirmation of this fact until the mine is cleared, it is believed that the four-day work stoppage allowed the mine's usual 1% to 2% of methane gas in the air to exceed the 5% danger point.

Use of electrical equipment such as coal loaders and cutters may have caused an arc or flame to ignite a gas pocket. Ignition of only 150 cubic feet of gas would have been sufficient to set off concussions stirring up coal dust and causing numerous explosions to follow. Coal dust has been found to be highly explosive and precautions often do not overcome this danger.

"Relatively few states," Daniel Harrington, chief of the health and safety branch of the U. S. Bureau of Mines, said, "require electrical equipment of assured safety."

Much equipment is used which could easily cause an arc or flame to ignite the gas. Careless striking of a match might also have set off the explosion.

Great danger faced the rescuing crews attempting to reach the miners. If any gas remained trapped in the mine, movement of air with the renewal of ventilation may move the gas out of the trap and push it within explosive distance of the many fires that are being encountered in the tunnel.

This mine disaster, Mr. Harrington noted, will bring the total mine injuries for 1945 to some 80 or 90.

"Irrespective of this disaster," Mr. Harrington said, "1945 gives the lowest rate of accidents in coal mining history."

Science News Letter, January 5, 1946

Dech

GEOLOGY

Prehistoric Hunting

Fifty or more fossil skeletons of giant buffalo have been found in a quarry on the High Plains of northwestern Texas.

► THERE was good hunting in Texas even in prehistoric times. Fifty or more fossil skeletons of giant buffalo, much bigger beasts even than modern bison, have been found in a quarry on the High Plains of the northwestern part of the state. Prof. E. H. Sellards of the University of Texas told the Geological Society of America at its meeting. Among the bones were 27 arrow-heads and knives, showing that primitive hunters had made a highly successful kill and cut up their quarry for feasting, or perhaps to dry in the sun and store for future use.

The find, which occupies a sandy layer some 500 square feet in extent and from a few inches to one and one-half feet in thickness, is in a situation that indicates that the hunters managed to drive the herd over a bluff into a river bed, probably killing more by falling and suffocation than by direct attack with weapons. Remains of a wolf, the only other large animal found in the excavation, suggests the presence of uninvited guests at the slaughter.

Hills Now Deeply Buried

► THE HISTORY of six hills that became islands and are now deeply buried beneath massive layers of limestone was told by Robert F. Walters, oil geologist of Tulsa, Okla. Half a billion years ago, Mr. Walters stated, an ancient land surface was eroded in what is now central Kansas. Six spots, where the formation consisted of quartzite, proved resistant to the erosion and remained standing above the ancient landscape as flat-topped hills.

Then the whole region slowly sank beneath the sea, leaving the hills above waterline as islands. The lagoons and channels among them silted up, and at the same time the bottom continued to sink, until finally even the islands were submerged and buried.

Ages later, the land re-emerged from the sea. Erosion again set in. The softer, later-deposited sediments were washed away, leaving the one-time islands again as hills.

Once again the sea invaded the western lands. This time submergence became

deeper and deeper, and layer upon layer of limy bottom silt gradually hardened into stone. Even today, long after a second re-emergence, there are still 3,300 feet of limestone above the tops of the six ancient hills.

This interesting feature of the deeply-buried topography of ancient Kansas was discovered, and its details worked out, during the course of explorations for oil pools.

Medal to Geophysicist

► A FEATURE of the proceedings was the presentation of the Penrose Medal of the Geological Society of America to Prof. F. A. Vening Meinesz of the University of Utrecht, who is now in this country as Delegate for Science of the Netherlands Government. Dr. Meinesz is the inventor of a multiple pendulum which can be swung in a ship and used to measure the value of gravity beneath the sea bottom. Using this in submarines,

he discovered a number of extraordinary regions of gravitational irregularities or anomalies. Dr. Meinesz is the sixteenth recipient of the Penrose Medal.

Science News Letter, January 5, 1946

AERONAUTICS

Flying Boat of Plywood To Be World's Largest

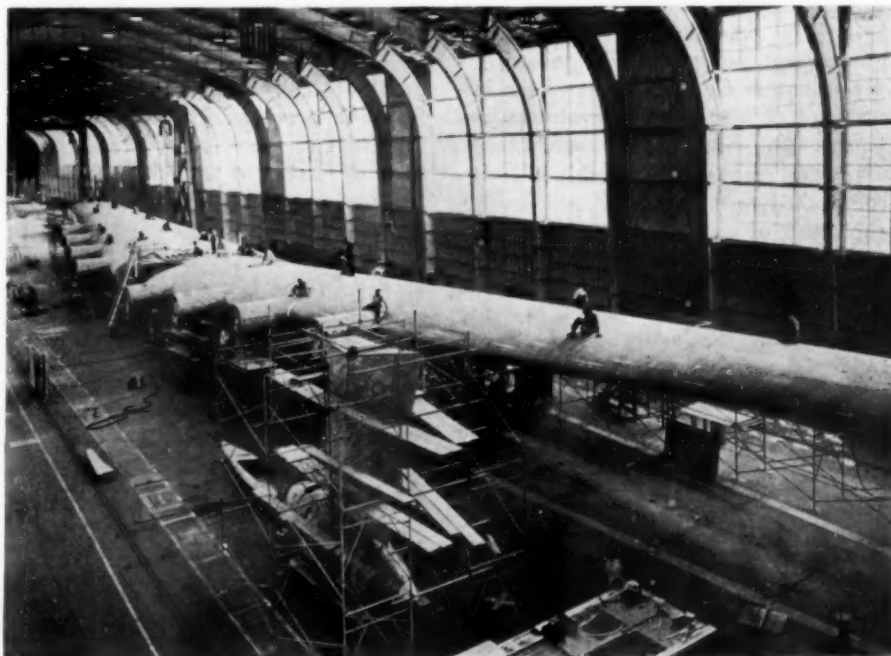
See Front Cover

► AN EIGHT-MOTORED flying boat three times as heavy as the previous world's largest, the "Mars," is nearing completion in Culver City, Calif. A novel view of the interior is shown on the front cover of this SCIENCE NEWS LETTER.

The new boat, designated by the manufacturer as the H-4, weighs over 200 tons, and is 200 feet long, with wing spread of 320 feet. It is powered by eight 3,000-hp motors, each with 4-bladed propellers 17 feet across. Forty-two tons of gasoline may be carried in its 14 tanks, and the hold is large enough to carry a B-17.

As a hospital ship it could accommodate 350 patients on stretchers, plus doctors, nurses and equipment. Its cruising speed is 175 miles per hour, with a landing speed of 78 miles per hour. Take-off distance of over a mile is required.

Aside from its spectacular size, the most unusual feature of the Hughes H-4



WING SPAN 320 FEET—Some idea of the size of the flying boat may be gained from this view of the wing panels of the H-4. Note the workmen as they appear in comparison with the parts on which they are working.

is its virtually all-wood construction. The only metal parts are forward of the fin walls in the eight engine nacelles. Solid wood could not be used. Trees do not grow large enough, and natural wood has too many inherent defects. Therefore plywood is used throughout for the frame of the hull, wings, tail surfaces, ribs, and for the covering of all major assemblies. Fabrication of these giant components is achieved by laminating and cross-plying selected wood veneers, using synthetic resin adhesives. The adhesive must be stronger and more durable than the wood itself, and must be completely water resistant. The curved sections are produced by the now familiar bag molding process.

This involves the use of a mold, over which layers of adhesive-coated veneers are laid cross-grained. The assembly is enclosed in a rubber bag, from which air is exhausted by vacuum, and then placed in an autoclave where steam furnishes both heat and pressure to fuse the veneers into a single solid structure.

The thickness of the veneers varies from 1/48 to 1/2 inch, and the synthetic resin adhesive must possess characteristics which will permit it to cure properly under the various required temperatures. Each of the millions of glued joints in wood construction must possess the necessary strength and show no deterioration.

Science News Letter, January 5, 1946

CHEMISTRY

Synthetic Fibers Research

▶ A SERIOUS WARTIME shortage of natural fibers in Germany, for clothing, canvas and rope, forced concentrated research, it is now revealed, directed toward the production of synthetic fibers with wool-like properties, and replacements for jute, sisal and hemp to make baling materials, rope and twine.

Germany obtained considerable wool from conquered countries, but the amount was insufficient for military uniforms. Its supply of cotton and rope-making fibers was very limited. Even before the war the plan of the Reich government was to make Germany independent, as far as possible, of the importation of raw materials for fibers, and also of natural fibers.

In the case of cotton, this was accomplished to a marked degree by the expansion of the rayon staple and tire yarn industries, but it was recognized that rayon staple fibers would not be entirely satisfactory for outside wearing apparel and for many technical and industrial uses.

German activities in the development of synthetic fibers have been studied on the ground since the close of the war by J. B. Quig of E. I. du Pont de Nemours and Company under a program of investigating German industrial and chemical methods sponsored by the United States government. His report is now released by the Office of the Publication Board, U. S. Department of Commerce.

The shortage of iron, steel and other metals, the report says, greatly stimulated the rapid development of hydrocarbon polymers and copolymers for the

plastics industry. Some of these polymers were capable of being made into fibers, and determined efforts were made to find polymeric fibers which would augment the natural fiber economy.

In the development of wool-like fibers, three lines of approach were followed. These were the modification, physically or chemically, of viscose and acetate rayon fibers; the preparation of a synthetic protein fiber; and the application of water repellents to the fiber or fabric.

By the first line of approach, a crimped cellulose fiber of viscose, cuprammonium or acetate solutions was obtained that duplicates fairly successfully the superficial characteristics and processing characteristics of wool, but obtained only a limited success in imparting water repellency, permanence of crimp, and resiliency of handle.

Many other synthetic fibers are reviewed by the investigator. His conclusion, relative to the status of wholly synthetic fibers in Germany, however, is that progress in the United States compares favorably with it.

Science News Letter, January 5, 1946

ENGINEERING

Cable Controls Operation On Bulldozer Tractors

▶ BULLDOZER operators, whether levelling Army airfields or building civilian roads, will welcome a new single-drum front-mounted cable control to raise or lower the heavy earth-cutting blade which is pushed forward by a caterpillar tractor. The new cable con-

trol, simple and easy to operate, is mounted where readily accessible on the front of the tractor.

This cable control is of compact design, permitting close mounting to the tractor. Cast-steel structural members and cast-steel case provide structural strength. Anti-friction bearings used throughout contribute to the ease of handling. The control embodies the smooth-performing multiple-disk type clutch that has proved satisfactory in the past.

Science News Letter, January 5, 1946

SCIENCE NEWS LETTER

Vol. 49 JANUARY 5, 1946 No. 1

The weekly summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N. St. N. W., Washington 6, D. C. North 2255. Edited by WATSON DAVIS.

Subscriptions—\$5.00 a year; two years, \$8.00; 15 cents a copy. Back numbers more than six months old, if still available, 25 cents. Monthly Overseas Edition: By first class mail to members of the U. S. Armed forces, \$1.25 a year. To others outside continental U. S. and Canada by first class mail where letter postage is 3 cents, \$1.25; where letter postage is 5 cents \$1.50; by airmail, \$1.00 plus 12 times the half-ounce airmail rates from U. S. to destination.

Copyright, 1945, by Science Service, Inc. Reproduction of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service.

Entered as second class matter at the post office at Washington, D. C., under the Act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature, Abridged Guide, and the Engineering Index.

The New York Museum of Science and Industry has elected SCIENCE NEWS LETTER as its official publication to be received by its members.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N.Y.C., Pennsylvania 6-5566 and 360 N. Michigan Ave., Chicago, STAt 4439.

SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation.

Board of Trustees—Nominated by the American Association for the Advancement of Science: Edwin G. Conklin, American Philosophical Society; Otis W. Caldwell, Boyce Thompson Institute for Plant Research. Nominated by the National Academy of Sciences: Harlow Shapley, Harvard College Observatory; Warren H. Lewis, Wistar Institute; R. A. Millikan, California Institute of Technology. Nominated by the National Research Council: C. G. Abbot, Smithsonian Institution; Hugh S. Taylor, Princeton University; Ross G. Harrison, Yale University. Nominated by the Journalistic Profession: A. H. Kirchhofer, Buffalo Evening News; Neil H. Swanson, Executive Editor, Sun Papers; O. W. Riegel, Washington and Lee School of Journalism. Nominated by the E. W. Scripps Estate: Max B. Cook, Scripps Howard Newspapers; H. L. Smithton, Executive Agent of E. W. Scripps Trust; Frank R. Ford, Evansville Press.

Officers—President: Harlow Shapley. Vice President and Chairman of Executive Committee: C. G. Abbot. Treasurer: Frank R. Ford. Secretary: Watson Davis.

Staff—Director: Watson Davis. Writers: Frank Thone, Jane Stafford, Marjorie Van de Water, A. C. Monahan, Martha G. Morrow. Science Clubs of America: Joseph H. Kraus, Margaret E. Patterson. Photography: Fremont Davis. Sales and Advertising: Hallie Jenkins. Production: Dorothy Reynolds.

CHEMISTRY

Nazis Made Peroxide

New process developed during the latter days of the war through the use of easily oxidized organic materials, it is now revealed.

► **WAR-ESSENTIAL** hydrogen peroxide was made in Germany during the latter days of the European conflict through the use of easily oxidized organic materials, it is now revealed. Production by this new commercial method was still on a small scale at the end of hostilities, but large-scale production appears to be feasible.

Conventional commercial methods of making hydrogen peroxide are electrochemical reactions involving the oxidation of solutions of sulfuric acid or ammonium sulfate. It has been known for some time that reactions involving the oxidation of easily oxidizable organic materials and the extraction of the resulting peroxide with water could be used; however, many factors limited the interest in these processes to laboratory investigation.

The methods discovered in Germany, in the Ludwigshafen plant of I. G. Farben Industries, were developed by two German chemists. The organic material used was 2-ethylanthraquinone. The pilot plant in use had a capacity of over a ton of peroxide a day. Plans, however, had been drawn up for building a plant with a capacity 12 times as great, but construction had not been started when the war ended.

The process is covered by a German patent issued in 1941, of which copies are available in the United States. The value of the discovery to America is that the feasibility of large-scale production of peroxide with relatively simple and inexpensive equipment by non-electrolytic methods has been proved.

Concentrated hydrogen peroxide has been called a new chemical tool which has many uses in industrial processes. The Germans used huge quantities in auxiliary devices for launching airplanes, V-bombs, naval torpedoes, jet-propelled planes and unmanned tanks. The production and use of this material were rated a top military secret by German authorities and elaborate precautions were taken to safeguard all information concerning them.

The information relative to this German method of making hydrogen per-

oxide was obtained during the postwar investigations of chemical production methods in Germany made by American scientists. The Ludwigshafen plant was visited and reported on by Ensign W. G. Gormley of the U. S. Navy. The report has just been released by the Office of the Publication Board, U. S. Department of Commerce, and can be obtained by those interested.

Among other hydrogen peroxide plants visited and reported on is the giant peroxide factory at Bad Lauterberg, investigated by Lt. Col. Max Woldenberg of the Chemical Warfare Service. Construction of this plant was begun in 1939, two units were completed by the summer of 1941, two more in 1942, and a fifth in December 1944. Each of the five units had a capacity of 240 tons a month, 80% basis. The plant used the electrolytic method, starting with the electrolysis of ammonium bisulfate.

Science News Letter, January 5, 1946

CHEMISTRY

D.D.T. Spraying of Pasture Can Make Milk Poisonous

► **DDT SPRAYING** of pastures or woodlands where dairy cattle graze may expose users of their milk to danger of poisoning, it is indicated by results of experiments reported by Drs. Horace S. Telford and James E. Guthrie of the research laboratories of Drs. Hess and Clark, Inc., of Ashland, Ohio.

The two experimenters first fed toxic doses of DDT to nursing female rats. The animals developed typical symptoms of DDT poisoning, and shortly thereafter the same symptoms appeared in their suckling young. Practically all of the rats died.

In another experiment the DDT was given to milch goats in rather heavy doses, and their milk given to adult rats. Again there was high mortality among the rats, though the goats survived. There was even a transmission of the poison: female rats receiving the milk had their milk poisoned in turn, for their young died. The poisoned milk



BOMBER TEST—This massive testing machine simulates landing effect of future giant bombers. This three-quarter-ton tire stops the 158 ton steel inertia wheel in 20 seconds. The 110-inch tire is slammed against the steel wheel as the steel speeds around at two miles a minute, simulating actual landing conditions without risking personnel or equipment.

from the goats seemed to have no ill effects on nursing kids, however.

Evidence was obtained that the poisonous principle is transmitted in the butterfat, for butter made from the poisoned goats' milk produced DDT symptoms when fed to rats.

Another ill effect of DDT on milk-producing animals was observed: milk flow was suppressed in the poisoned goats in from three to four weeks.

Another suggested possible source of DDT poisoning in dairy cattle is the habit cows have of licking their own skins. Thus, a cow getting in the way of a DDT sprayer could easily transfer much of the poisonous chemical from her skin to the milk. Goats do not have this licking habit. Goats receiving DDT spray on their skins remained unaffected, which is taken as evidence that the DDT is not absorbed directly through the skin.

Science News Letter, January 5, 1946

Cabbage-breeding for a high vitamin C content has already produced some lines with vitamin value exceeding those reported for grapefruit, limes and orange juice, and equalling that of lime juice.

Match sticks are treated with *ammonium phosphate* to prevent lingering embers after the flame has been blown out.

CHEMISTRY

Quick-Molded Plastics

Lenses and prisms were mass-produced during the war for gunsights, range-finders and other optical instruments needed in combat.

► QUICK-MOLDED plastics, not laboriously ground and polished glass, supplied the hundreds of thousands of lenses and prisms needed in artillery sights, range-finders, field glasses and other optical instruments used in combat.

For the first time, mass production methods in these optical parts was brought to a sufficiently high point of precision to permit the older, slow-produced glass parts to be shoved almost entirely aside.

The problem of combat optical instruments was seen as acute even before Pearl Harbor. World War I had caught the United States with no optical-glass production capacity of its own. This situation was remedied shortly after 1918; but although 1940 found us with plenty of good glass, it was evident even before hostilities started that our national capacity to grind and polish it into lenses and prisms could never meet the insatiable wartime demand.

For this reason the National Defense Research Committee set up contracts, principally with Harvard University and the Polaroid Corporation of Cambridge, Mass., to investigate possible moldable plastic materials of optical quality and to design needed new types of instruments. Polymers of 113 organic compounds were tested for such qualities as homogeneity, hardness, toughness, clearness—an even dozen points altogether. Only two scored high enough to be considered worth adoption: polycyclohexyl methacrylate (CHM for short) and the more familiar styrene. Most of the optical parts subsequently molded were made of the CHM polymer.

The molds in which the plastic lenses and prisms were to be cast got the careful grinding and polishing that is usually lavished on glass optical parts. When the molasses-like plastic mass was poured into them and subsequently hardened, it came out as parts with surfaces already optically perfect, ready to be installed in the instruments without further treatment.

This does not mean that all the troubles of optical instrument makers are over. Easily produced though they are, these plastic lenses and prisms are not

the equal of their glass counterparts. Their great advantage for war purposes was that they could be mass-produced fast enough to meet the demand, which was away beyond the possibilities of our glass-grinding industry. Optical plastics are softer than optical glass; they scratch relatively easily and must therefore either be given glass protective coverings or undergo frequent replacement. However, this and other handicaps are being worked on, and it may well be that postwar research will bring notable advances in an entirely new branch of the optical-goods industry.

Science News Letter, January 5, 1946

PUBLIC HEALTH

A.M.A. Health Plan Called Inadequate

► WHILE SOME members of the American Medical Association undoubtedly are applauding the program for nation-wide voluntary health insurance adopted by the association on Dec. 5, other members remain dissatisfied and critical.

The program is termed a "totally inadequate alternative to President Truman's National Health Insurance plan" by the Physicians Forum in a statement issued by its chairman, Dr. Ernst Boas. The statement follows:

"The Physicians Forum, comprised of doctors who are all members of the American Medical Association, has spent many years of study on the subject and has come to this conclusion: voluntary health insurance is merely an indication of what could be accomplished on a national scale if the President's proposal assuring the health of all Americans is passed by Congress. Until their recent reversal, the American Medical Association strongly opposed even this elementary device for medical care.

"Over 40% of the counties in our country have no satisfactory general hospital, which fact in itself makes it impossible for any voluntary health insurance plan to be adequate for the nation. Furthermore, the lower income groups have three times as much sickness as those in the higher brackets but are

only able to spend one-third as much on medical attention. Since 50% of all the families earn less than \$2,000 a year, it is impossible to expect anything approaching the needed medical care under a purely voluntary system where costs are fixed regardless of income.

"It is therefore obvious that voluntary health insurance, as now proposed by the American Medical Association, will never be adequate to supply sufficient medical care to all the people. The Physicians Forum believes that the proposal made by President Truman for nationwide social security legislation to finance health insurance in proportion to the ability to pay is the only effective method in accord with the American tradition."

Science News Letter, January 5, 1946

CHEMISTRY

Steps Toward Synthesis Of Penicillin Announced

► STEPS TOWARD synthesis of penicillin, anti-germ chemical which a humble green mold makes apparently with ease, are announced by the Committee on Medical Research, Office of Scientific Research and Development, and the British Medical Research Council in London. (*Science*, Dec. 21).

Efforts of 38 different groups of scientists, 17 in Britain and 21 in the United States, have not yet succeeded in producing a synthetic penicillin, so far as the now published results show.

The several known antibiotics of the penicillin class all have the empirical formula $C_{16}H_{11}O_4SN_2R$. The constitution of the R part of the compound is different in each of the penicillins. While the above formula tells the scientists which elements and how much of each are contained in penicillin, the way they are arranged in the penicillin molecule apparently has not yet been determined. This knowledge would be essential to synthetic production of the mold chemical in the laboratory. The two structural formulae to which workers in the field now are giving "the most attention" contain respectively a beta-lactam structure and an azlactone grouping.

Since penicillin is now obtained on a commercially practical scale from the mold and since its chemical nature is so difficult to determine, it seems unlikely that synthetic penicillin will ever be produced outside of scientific laboratories. Efforts to synthesize it, however, will doubtless continue.

Science News Letter, January 5, 1946

ENGINEERING

Keep America in Lead

Ordnance, science and industry must continue to work together to keep us prepared as the best assurance against another war.

► IT TAKES TIME to develop and manufacture the materiel required by modern war, declared Maj. Gen. G. M. Barnes at the meeting of the American Society of Mechanical Engineers in New York. "We may not be so fortunate in the future with respect to time as we have been in the past," he commented.

"We believe that the best insurance against war is to be prepared," Gen. Barnes emphasized. "This will require much long-range research and development work, looking to weapons the future may demand. These reasons are sufficient to compel all of us to continue the close association of ordnance, science and industry, who have together produced the weapons in this war and who, working together in time of peace, will keep our country always in the lead."

An appropriation of \$1,250,000,000 for the Army Ordnance Department, made in 1940, rendered it possible to manufacture weapons for the British, who used our tanks and ammunition to stop the Germans at El Alamein, he said. The money made it possible for the De-

partment to release its plans for the industrial mobilization of the country, worked out during the preceding 20 years.

It was immediately seen that new and more effective weapons must be developed, he stated. It was realized that the task could not be done by Army officers alone. "The only hope," he declared, "was to place the program with the scientific and engineering talent of the country, where facilities suitable for this purpose were available. This became the policy of the Ordnance Department."

"During the past three and a half years," he explained, "more than 1,000 new items of ordnance were so developed, tested at the Ordnance proving ground, again tested by the combat arm which was to use the weapon, accepted by them, standardized and placed into quantity production."

Science Research Vital

► "MANY FUTURE epochal developments in such fields as the harnessing

of atomic energy and its employment aboard ship, radar and electronics, supersonic speed, the rocket and the jet for the propulsion of missiles and aircraft, are dependent upon increased emphasis on scientific study and training," declared Rear Admiral Harold G. Bowen, USN, at the same meeting.

Referring to the alarming deficiencies created by the war in the supply of potential scientists and technical men, the Admiral said that this lack must be made up and the general level of technical knowledge must be raised.

"With good men we can expect greater scientific achievements, and therein lies the future of our country," he emphasized.

As one example of scientific progress in the Navy, Admiral Bowen told the hitherto unrevealed story of how the Navy reached the decision to use high-pressure, high-temperature steam. "High pressure, high-temperature is an inadequate expression for this development," he said, "because much more transpired than raising pressure aboard ship to 600 pounds and the temperature of the steam to 850 degrees. It represented a complete break with the past. It indicated that engineering in the Navy had arrived at its maturity and had entered an independent existence."

"The introduction of these pressures and temperatures was accompanied by a complete re-engineering job of every ship that the new Navy was building. By using turbines of American design, we were able to reduce the number of blades in one instance from 17,000 to 1,700 and produce a much more rugged, reliable turbine. Turbine speeds were greatly increased until we reached 10,000 r.p.m. for an idling cruising turbine. Entirely new boiler designs were adopted which embodied superheat control, economizers, air casings and a capacity for 40% overload. Feed systems with oxygen removers were installed. Double reduction gears were required due to the high speed of the turbines and space limitations. Emergency Diesel electric generators were adopted. The whole electrical system was changed from D.C. to A.C. Flame-proof cable was employed. Steam piping without slip joints made its appearance and alloy steel replaced carbon steel for heavy duty.

"The result of this program was, that by the time of Pearl Harbor, the Navy had completely redesigned, proved at sea and standardized, all of its machinery for both surface ships and submarines."

Science News Letter, January 5, 1946



LONGER RANGE—The newest in turbojet planes, is the XP-83, longest range jet-propelled airplane in the world. Developed by the Bell Aircraft Corporation, it has demonstrated a high speed in excess of 500 miles per hour and possesses aerodynamic characteristics suitable for extreme speeds.

PUBLIC HEALTH

Case Reports Indicate Flu Epidemic Waning

► THE INFLUENZA epidemic is waning, it appears from the number of cases reported to the U. S. Public Health Service. From a high of 134,962 cases the week ending Dec. 15, the figure dropped to 42,552 the week ending Dec. 22, latest for which figures are available.

The figures are not strictly comparable, since the one for Dec. 22 represents reports from only 43 states and the District of Columbia, but it is believed that when all states have reported, the total will still be considerably below the previous week's. More than half of the cases reported Dec. 15 were from one state, Kentucky. For that week Kentucky reported 89,363 cases, but only 6,816 for the week ending Dec. 22.

If the current epidemic follows the pattern of the 1943-44 one, it will be pretty well over in another week or two. Cases that year reached the highest figures the weeks ending Jan. 1 and Jan. 8 and then declined.

Science News Letter, January 5, 1946

CHEMISTRY

Sorting Machine Isolates Uranium 235 in Vacuum

► A SECRET piece of equipment with a meaningless but adequate designation, a "Calutron," is an electrical sorting machine that hurls invisible atoms into a vacuum chamber and groups them according to weight. It was used in the isolation of uranium 235, the chain reaction metal used in atomic bombs, it is now revealed.

These pieces of equipment were constructed by the Westinghouse Electric Corporation after their development by University of California scientists and Westinghouse engineers. None of the 800 workers who made various parts knew what the completed machine was to be. After completion the machines were shipped to the atomic bomb plant at Oak Ridge, Tenn.

"The Calutron is able to sort atoms because of atomic weight variances," Dr. L. W. Chubb of Westinghouse explains. "First, uranium is introduced into the machine in volatile form and strikes an arc of electricity, discharged into a vacuum. This breaks it down into atoms and tags each atom with an electrical charge. A magnetic field in the tank causes the ionized uranium atoms to move in circular paths.

"Uranium 235 atoms, being slightly lighter than other atoms of uranium, move in a slightly smaller radius," he continues, "and separate receiver boxes can be placed at appropriate places to catch atoms of each kind."

Science News Letter, January 5, 1946

CHEMISTRY

"Fog Generator" Used for Application of DDT Spray

► DDT in the minute droplets of artificial oil fogs promises to be one of the most useful and economical ways of applying this new insect poison for the protection of orchards, vineyards and woodlands. It was first tried out during the war with a Navy "fog generator", at that time a secret weapon for the production of a concealing white mist of ultra-fine oil drops. The droplets thus dispersed proved to be even finer than needed, for the fog rose higher than the plants to be sprayed. However, the test was successful in leaving microscopically fine crystals of DDT well distributed on the vegetation after the mist had cleared and the deposited oil droplets had evaporated.

Now a specially designed "fog sprayer" has been built for agricultural work by the Todd Shipbuilding Corporation, constructors of the original Navy oil-fog machine. The new apparatus has a different appearance but works on the same principle. Its mist of oil drops clears more quickly than the Navy's oil fog, but distributes the DDT in even more effective fashion.

Science News Letter, January 5, 1946

PHYSICS

Vacuum Tube With Built-in Microphone

► A VACUUM tube with a microphone diaphragm sealed directly into its side wall is the novel invention on which Jerome Rothstein of Belmar, N. J., has received patent 2,389,935. Among possible users for a tube of this type which the inventor lists are detecting minute sound and mechanical vibrations; measuring changes in barometric pressure, temperature, turbulence, altitude, wind pressure and wind velocity; gauging depths of submergence in a liquid and measuring the elastic properties of solids. It is claimed to be especially useful in remote-control and remote-recording setups. Patent rights are assigned, royalty-free, to the government.

Science News Letter, January 5, 1946

IN SCIENCE

GENERAL SCIENCE

Fellowships for Science Veterans Still Available

► SPECIAL fellowships established by the National Research Council to enable young scientists whose graduate studies were interrupted by the war to resume their work toward the doctorate are still available, but applications must be in by Feb. 1.

The fellowships were made possible by a grant of \$335,000 from the Rockefeller Foundation, to help close up the war-caused gaps in the ranks of American research workers with minimum loss of time. Prospective graduate students are urged to get their applications in at once, even though they may not be able to resume their studies until later.

Successful applicants will be given \$1200 a year for single persons and \$1800 for married men, with an additional allowance up to \$500 a year for tuition fees. Fellowships granted to individuals who are eligible for educational support under the G.I. Bill of Rights will be limited to the amounts necessary to give the standard fellowship.

Science News Letter, January 5, 1946

ORNITHOLOGY

Two Pairs of Quetzals At Zoo in Washington

► TWO PAIRS of quetzals, sacred birds of the ancient Mexican and Central American peoples, have arrived at the National Zoological Park in Washington, D. C., Director William M. Mann stated. They were brought from Costa Rica, in Central America.

The quetzal is a bird about the size of a dove, with brilliant green-gold upper plumage, that shimmers blue when the sun strikes it. When fully grown it trails two tail-plumes three feet long. The new specimens are young birds with eight-inch tails.

Once widely distributed in the American tropics, the quetzal has been so persecuted by plume hunters that it is extinct over considerable parts of its former range. It used to be considered impossible to bring out living specimens, but in recent years this has been successfully accomplished with a few birds.

Science News Letter, January 5, 1946

SCIENCE FIELDS

PHYSICS

"Spurious Echo" in Radar Was Caused by Birds

► RADAR pickups of flying birds, often made and correctly interpreted by both British and American observers during the war, were also made by German radar operators, but the Nazis never guessed what caused what they termed *Scheinziele*, or "spurious echoes." A German document on the subject has been turned up by British investigators, and is briefly summarized in the scientific journal, *Nature*, by H. A. C. McKay of the Admiralty's Miscellaneous Weapon Development Department.

The Germans noted that these "spurious echoes" came with especial frequency from the wide mouths of rivers, which of course is just where one might expect to get radar reflections from flocks of geese, ducks and other waterfowl. The document as printed gives them the improbably high speed of 600 kilometers (372 miles) an hour; Mr. McKay is inclined to regard this as a misprint for 60 kilometers (37.2) miles an hour.

How the Nazi radar experts must have groped foggily for an explanation is evidenced by one passage: "The physical origin of spurious echoes is so far unexplained. It is probably a matter of sharply bounded layers of discontinuity in the atmosphere. Charges, cloud movements, aerial vortices, as well as the boundary region between two layers of air can be suggested as possibilities."

They even planned a program of research, to locate such "discontinuities" in the atmosphere.

Science News Letter, January 5, 1946

AERONAUTICS

Pilotless B-17 Bombers Blasted U-Boat Bases

► "WAR WEARY" planes, aircraft that were flyable but unfit for combat because of age or condition, were used, pilotless, to destroy German submarine pens on the coast of Europe, it is now revealed. Loaded to capacity with dynamite, and directed by radio, radar and television, they hurled themselves at very low-level directly against U-boat bases.

B-17 bombers were used for the pur-

pose. Each carried 11 tons of Torpex, a high explosive many times more powerful than TNT. They were taken aloft by pilots and co-pilots who at 10,000 feet bailed out over Britain. Control of each bomber was then taken over by a "mother" plane, another B-17, whose pilot used radio to guide the giant bomber, radar to keep in touch with it through overcast and to search for unseen obstacles in its path, and television to aid in aiming the "baby" at the target.

Approach to the target was usually made at an altitude of 200 to 300 feet, to heighten the blast effect and cut down the accuracy of enemy fighter and flak opposition. The "mother" ship generally remained within five miles of its "baby", although it could guide it from a greater distance.

Science News Letter, January 5, 1946

CHEMISTRY

Germans Had Superior Air Purification Methods

► AIR PURIFICATION devices developed in Germany for use in submarines, especially in the one- and two-man U-boats, appear to be well ahead of Western Allied developments, according to American official investigators who visited Germany under the sponsorship of the United States government.

Development work by the Draegerwerk (Draeger factory), at Luebeck was investigated particularly, and especially work on air purification devices for underwater craft and for high-altitude demand regulators. An official report has been prepared, copies of which may be obtained from the Office of the Publication Board, U. S. Department of Commerce.

The Draegerwerk, well known for its production of precision instruments, was concerned with high-altitude oxygen breathing apparatus; submarine escape apparatus; diving apparatus; gas masks; oxygen cutting and welding apparatus; mine safety devices; swimming vests for pilots; rubber, surgical and technical goods, and other essential products. The report discusses them all.

Air purification devices for one- and two-man U-boats are important items. A less bulky system is required than ordinary equipment incorporating a fan and motor. This is particularly true in craft designed on the torpedo principle. The system developed at this plant was later used in German midjet submarines.

Science News Letter, January 5, 1946

METEMOLOGY

Light, Powerful Magnet Made from Iron Oxide Ore

► A NEW TYPE of small, light, but powerful magnet made of iron rust and cobalt oxide has been developed by the General Electric Company, it is now revealed. It has been used in highly sensitive aircraft meters and in other wartime devices, and now will be available for general civilian uses. It is claimed to be the lightest magnet ever developed.

Actually, it is not made with the familiar rust seen on unprotected iron implements, but from an iron oxide ore in which the oxide is chemically the same as iron rust. The iron oxide and the cobalt oxide, both in powder form, are mixed in the proper proportion and formed into a solid by the process known as powder metallurgy. This means that the mixed powders are placed in a mold and sintered, that is, heat treated at a temperature well below fusion point.

The new type of magnet is a non-conductor of electricity and is not easily demagnetized. It thus may be used in high-frequency magnetic fields with little eddy current loss, it is claimed.

Science News Letter, January 5, 1946

CHEMISTRY

Non-Petroleum Motor Oil Flows in Zero Weather

► A NON-PETROLEUM war-tested motor oil for automobiles and aircraft engines will be on the market in limited areas this winter. The new product flows freely at 30 degrees below zero Fahrenheit, does not thin out at high temperatures, and provides efficient lubrication of the moving parts when the engine is running, it is claimed.

This engine lubricant will be known as Prestone motor oil. It is produced by Carbide and Carbon Chemicals Corporation, a unit of Union Carbide and Carbon Corporation. It was developed by research chemists of the producer, the research beginning in the early 1930's. It is a chemically created oil that resembles ordinary motor oil.

The new product will clean motors which have been gummed and sludged by ordinary oils, it is claimed. It is wax-free. It is characterized by low change of viscosity with changes of temperature, and can be used the year around without change of grade. However, excessive gasoline dilution and accumulation of dirt make oil change necessary.

Science News Letter, January 5, 1946

GENERAL SCIENCE

Science Previews

1946 will bring enlarged and accelerated resumption of pure and applied research and announcements of steps toward conquest of important diseases.

By **WATSON DAVIS**

► **THE YEAR** 1946 will be crucial for science and technology applied to a world at peace. There will be announcements, as there have been in several instances in past years, of significant steps toward the conquest of important diseases or introduction of new techniques of industrial importance.

Even more important in the long view will be the accelerated and enlarged resumption of pure and applied research in many fields neglected during the war when all the energies of scientists and engineers were devoted to war.

The release of atomic energy and the many problems that it has presented to a startled and fearful world will during 1946 continue to be a matter of major concern. How successfully this situation is handled from an international standpoint will largely determine whether the world will have another war in 10 to 25 years.

Fundamental Research

A National Research Foundation that will give fundamental research in physics, chemistry, biology, medicine, psychology and other fields the moral and financial support of the people through Congressional enactment will in all probability be established early in the year. This will make possible in universities, laboratories and other institutions the sort of earnest and hard-hitting research that directed at war has brought such significant results. Only the short-sightedness of factions of scientists if they continue to insist upon a certain kind of administrative set-up for the government support will seriously delay this most important step in science's reconversion.

During 1946 there will be the first applications of atomic energy for industrial power if the legal and policy difficulties of releasing atomic energy for such use are solved.

The immense amounts of radioactive materials produced as a by-product of the manufacture of plutonium, one of the atomic elements, will present new

possibilities of treating cancer and other diseases, and there will also be ample amounts of radioactive tracer elements to use in the exploration of the nature and origin of many other diseases and physiological processes.

The world systems of air transport for passengers and materials built during the war will go into peacetime service and the interchange of peoples between previously remote portions of the world will be accelerated. Air passenger service will benefit from the development of bombers and transport planes that was accelerated by the war and many new or re-conditioned planes of large capacity will become available.

Further steps in the development of jet and rocket propulsion for aircraft will be taken in research laboratories, with the consequence that many of the most advanced types of fighters and bombers used in the war will begin to become obsolete.

Upon drawing boards and in experimental models there will be the beginnings of commercial as well as military craft that will fly faster than the speed of sound at high altitudes.

From the electronics of the war will come more techniques for the use of automatic machinery in factory and home. Very small radio tubes such as used in the proximity fuze make possible radio sets of small size which may be commercially available about the middle of the year. Military walkie-talkie experience will be applied to a citizen's radio service which uses short-range portable radio combined transmitters and receivers to keep moving vehicles and boats and remote locations in communication with other such apparatus or linked into regular telephone lines.

The radio location network, known as loran, that allows ships and planes to determine position by receiving special timed radio impulses, will be continued after its war installation to guide peace-time traffic. Although less useful in peace, radar will be used as an anti-collision device.

Prediction of radio transmission conditions, dependent upon solar phenom-

ena and earth atmospheric conditions, will allow practical forecasts several months in advance.

From intensive research now in progress, expect some important developments in our understanding of cancer. List also on the medical timetable of the future the possibility of better chemical treatments of tuberculosis as the result of some of the new drugs under development.

Streptomycin, the newer antibiotic, is likely to come into larger commercial production for use on kinds of infections that are not effectively treated by the sulfa drugs and penicillin.

Further Disease Study

One great class of disease causes, the viruses, have as yet not been checked by chemotherapeutic agents and among the many new drugs being explored there is the hope that during 1946 one that has promise of virus disease control in human beings will be found.

Medical care and the promotion of health among the people is a major unsolved problem, made more difficult by the vested interest attitude of the medical profession and their opposition to any plan for paying for preventive and curative medicine by the social security method. During the year a practical method of giving better medical service to all, with government supervision, may be enacted by Congress.

Colleges Will Be Filled

The colleges and universities of the nation will be filled to overflowing with veterans and war workers who are returning to get science and technology training needed so urgently by our industries and laboratories. The proved fruitfulness of science will attract to scientific studies even larger numbers of college students.

The matter of universal military training may not be resolved until Congress and the nation as a whole has had a chance to integrate the military preparedness of the country with the necessary peace-time education and training which, because of the whole-people aspects of any future war, becomes as important as conventional military training.

With the return to civilian life of psychologists and psychiatrists and the

release of formerly classified information, we may expect new developments useful to industry and public mental health.

Industrial machines as well as automobiles and airplanes will be designed so as to be more suited to the men and women that operate them. This will result in a lessening of fatigue and nervous irritation.

There may be a widespread tendency to train foremen and supervisors by newly developed techniques to consider the human needs of their employees in placing them so as to make best use of their abilities, in arranging working groups in such a way as to avoid frictions, in encouraging participation in planning of work and in arranging working conditions so as to avoid unnecessary nervous strains.

New sciences for the study of the psychology and mental illnesses and disorders of nations, groups and social classes may be born.

The connection between ordinary fatigue, nervous exhaustion, and mental illness will be explored and may result in finding some chemical factor in mental breakdown. This may point the way toward a new treatment.

Exploratory expeditions in all fields will begin to take the field again. The large amounts of scattered real estate that we have had to take over, especially in the Pacific, will be a challenge and an opportunity to field scientists all the way through the alphabet, from anthropology to zoology.

More Soilless Gardens

Further installations of soilless gardens will be made on desert islands, where Americans will have to be stationed to take care of military and civil airfields.

Pesticides (DDT, ANTU, 1080, 2-4-D, etc.) will come into general use, as manufacturing facilities are released from military demands. Much more research will have to be done on these: (1) to learn their most effective use, (2) to find their limitations, (3) to discover thresholds of safety for contact with human beings, domestic animals, wildlife, harmless or beneficial insects.

New insect pests and plant diseases may break through our quarantine barriers, due to increased air travel. Greater vigilance will be necessary to try to prevent this; ruthless and costly extermination campaigns must be carried out if a major pest does get in.

Air transportation may begin to bring



MEDICINE ADVANCES—The public will benefit greatly from medical research in the future. This scene in the Naval Medical Research Laboratory at Bethesda was selected to typify the activities expected to continue in Navy, Army and civilian medical research institutions.

in some of the tropical fruits and other products our men had a chance to get acquainted with overseas, like mango-steen, cherimoya, etc. Here again, vigilance against pests and diseases will be needed.

There will be at least a beginning of restored trade in war-scarce tropical commodities, especially rubber, drugs (especially quinine), and spices (especially black pepper); overseas sources of other goods, such as Manila hemp, Chinese tea, tung oil, also from China, copra and all the palm oils, camphor from Formosa will be making their bid for restoration of normal markets. Bulk tropical commodities like sugar will return as shipping becomes available.

Restoration Aid

Restoration of European agriculture and livestock industry will be helped by shipments of seed and breeding stock from U. S. A. and other war-spared lands.

Using its developments and production for war, industry should during 1946 bring forth many new devices, machines, products and processes. Plants devoted to airplane manufacture can be expected to give birth to new kinds of

assembled houses and new makes of automobiles. Television farther advanced and seeing more effectively in near-darknesses may be announced and put into use.

Better and more easily developed color photography will be released for amateur and professional use, while important developments in removing much of the personal element from printing three- and four-color photographic processes may be announced.

Even the atom bomb will have its effect on industry even if atomic energy is not used industrially or bombs do not wipe out civilizations. The advances made in technical methods during the atom bomb development have made available thousands of improvements to industry.

Science News Letter, January 5, 1946

An adult has in his body about 1.4 pounds of phosphorus which must be constantly replenished by means of foods consumed.

When using luminous paint, new brushes are recommended because it is difficult to clean used brushes from traces of old paint that might be detrimental to the luminous material.

Do You Know?

The United States produces about 97% of the world's supply of grapefruit.

Vanillin, an essential flavor and perfume substance, occurs in vanilla beans to the extent of two or three per cent.

On the flanks of the *shrew* is a gland that secretes a substance with a pungent odor that may save it from some of its enemies.

Chinese doctors have prescribed *seaweed* for centuries in treating goiter though knowing nothing whatever about its iodine content.

The absence of the pink *bollworm* from the United States has enabled this country to compete with the other cotton producing countries in spite of our higher labor costs.

The science of *metallography*, which deals with the internal structure of physical constitution of metals, began to develop a half-century ago; now it is an indispensable standby of the steel technologist.

"*Super fuels*," added to low-octane gasoline to raise the octane rating, are produced mainly by compressing certain abundant petroleum refinery gases to liquids and combining the liquids in the presence of hydrogen fluoride.

Products of red and brown *seaweeds*, such as agar, algin, and carrageenin, should have "phycocolloid" as a group name, the Scripps Institution of Oceanography suggests; seaweed gums and mucilages are unsatisfactory names, it says.

THE SCIENTIST IN ACTION

by
W. H. GEORGE

A SCIENTIFIC STUDY OF HIS METHODS

This book is for those who need to do ORIGINAL thinking. CLEAR thinking. THINKING WITH A PURPOSE. Helps you to DISCOVER ideas, tells you how to DEVELOP them! Explains clearly METHODS OF WORKING to get RESULTS.

N. G. WELLS "Writer To The Author": "... I took up your book about a quarter to eight. At nine my partner would come to ask if I wanted any dinner tonight. It is now close on to midnight. But I realize now that your book is of the UTMOST IMPORTANCE and I feel tremendously let up by it..."

Most respectfully yours,
H. G. Wells

CHOICE OF BOTH BRITISH and AMERICAN SCIENTIFIC BOOK CLUBS

354 Pages • Price \$3.00 • Postage free.
3-DAY MONEY-BACK GUARANTEE
At All Bookstores, or from
Emerson Books, Inc., Dept. 541-C, 251 W. 104th St., N. Y. 11



Winter Drought

► DROUGHT is something we usually think of in connection with late summer's burning sun, hot winds and baked soil. In winter, when annual plants are all dead and most of the woody perennials leafless, there doesn't seem to be much chance for vegetation to droop and wither for lack of moisture. Besides, it isn't hot enough to evaporate water rapidly.

Nevertheless plants, even in winter condition, can suffer from loss of water. Winter often brings really severe drought, despite low temperatures. Temperature is only one of the factors that produces evaporation. Another rather important factor is air movement that blows water vapor away as it comes off the evaporating surface; and no one can deny that there are winds in winter. Moreover, they are often very drying winds. Even during a blizzard, when the air is filled with snow, the relative humidity may be away down. These conditions are especially liable to obtain in the West, where people talk of the "dry" cold.

Still, supposing midwinter atmospheric conditions do favor evaporation, how should that affect plants? They are close-reefed, and frozen solid besides. A lump of ice can't evaporate!

But right there's the rub: it can. Water vapor can come out of ice just as it can out of liquid water, even if not so rapidly. In the strictly technical sense of the term it is not evaporation. Physicists have a special name for this change from the solid to the vapor state without the intervention of a liquid phase: they call it sublimation. But no matter what the process is called, the

stock of water in a winter-bound plant can be depleted by loss as vapor. And since roots can't suck any water out of the ice in the soil, replenishments are impossible.

Of course, the water in the woody stems of a tree or shrub in winter isn't really ice. It has sugars dissolved in it, and other things that make it more or less like mucilage; and everybody knows that sugar syrup or mucilage do not freeze as readily as pure water. (Indeed, if ice crystals form in the tissues of a plant it is a very bad thing for the plant). But to return to our story of evaporation: water can disappear as vapor from even the carbohydrate-thickened sap, and the plant will feel the effects of drought, no less than if it were losing water to a hot summer sun.

Science News Letter, January 5, 1946

PSYCHOLOGY

Expensive Perfume Is Not Preferred to Cheap Kind

► IF YOU gave your girl friend perfume for Christmas and couldn't afford the most expensive brand, she may be just as well satisfied with a cheaper kind.

Sixty-nine students at the University of California sniffed six different perfumes in a test to see whether the kind costing \$16 an ounce was any better liked than another costing only 50 cents.

Results of the test are reported by Dr. Gladys M. Jewett, in the *Journal of General Psychology*. In the case of lilac perfume, only slightly more than half preferred the \$16 brand (56%). With the gardenia, 55% preferred the fifty-cent kind to an \$8 variety. With apple blossom, there were a few more votes for the expensive kind—69%.

There is no consistent relation, Dr. Jewett decided, between the price of the perfume and the preference of the lady. The lady, however, did not know the prices of the perfumes she tested. There was no difference in lasting quality within an eight-hour period.

Unfortunately, it was not possible to compare the judgments of the girl students with those of men, due to the exodus of men from the University for service.

Science News Letter, January 5, 1946

Fiberglas bandages are used for fractures and similar injuries to the human body; fiberglas-plastic cast weighs about one-fifth as much as a plaster cast and does not block X-ray penetration.

AERONAUTICS

America's Fastest Plane

The Army's P-80 Shooting Star was made possible by two revolutionary types of jet engines. Engines are designated as the I-16 and the I-40.

► TWO revolutionary types of jet engines made possible America's fastest plane, the Army P-80 Shooting Star, headquarters of the Air Technical Service Command at Wright Field has revealed. The engines are designated as the I-16 and the I-40.

The I-16, created by General Electric Company and Army engineers, was used in the P-59 trainer in which jet pilots were trained. From it was developed the more powerful I-40, sometimes called the super G-E jet.

The basic principle of the two engines is the same. The chief difference lies in an improved line of gas-flow through the main turbine.

In both engines, air is drawn through an intake duct in the front and forced into the combustion chamber by means of a centrifugal compressor. This is simply a high-speed fan.

Kerosene is used for fuel. It is injected into the combustion chamber where it is atomized, mixed with air, and burned. Continuous combustion of the kerosene occurs at approximately a constant high pressure, resulting in a stream of high-velocity gas which is released through the rear nozzle, thus driving the plane forward. The turbine, a fan-like wheel, is activated by this stream of gas and provides power for the compressor.

In the I-16 the course of the stream of gas is reversed twice in this process, while in the I-40 the flow is direct, resulting in less loss of power. This is the main difference. Both engines are developments from the British jet engine invented by Air Commodore Frank Whittle.

Rigid flight tests of the I-40 jet engine are now being made by the General Electric Company, with the engines installed in converted B-24 Liberators. This was revealed by N. F. Frischhertz, one of the company's engineers, at the recent New York meeting of the American Society of Mechanical Engineers. This is for the future development and testing of the jet engine under actual flying conditions.

The converted Liberators are called "flying laboratories" and are used be-

cause they provide a great number of facilities and advantages of a ground test cell, or wind tunnel, at considerably less cost and with greater availability. Their use also allows flight space for design engineers to observe operation under flight conditions.

At the same meeting of mechanical engineers, Dr. William F. Durand, formerly chairman of engineering and industrial research, National Research Council, declared that future development of jet propulsion demands continuing detailed research into design and construction, both in the jet engine and the plane on which it is to be used. The jet engine "will undoubtedly occupy a highly important place in the field of aircraft propulsion," he said.

Science News Letter, January 5, 1946

AERONAUTICS

Improved Methods Needed For Airplane Traffic

► AIRLINERS are now spanning oceans and continents with a volume of traffic which creates serious hazard situations calling for vastly improved methods for handling arrivals and departures at established terminals, engineers were told at the Chicago meeting of the Society of Automotive Engineers. International air traffic, they were informed, already has reached proportions that make airways control and air navigation problems of the first magnitude, demanding prompt solution.

Navigation aids for long-range flights, developing far beyond those available to other transportation media, were said to contribute to the efficiency of aviation operation, with war-developed electronic and radar devices widely applicable. Contrast was drawn between the ease and safety en route over the ocean, and the delays, difficulties and dangers created by congestion at the air terminals.

The development of a comprehensive system of air navigation, control and communications was proposed by Capt. S. P. Saint of American Airlines. It should include, he said, every known principle of safety engineering. He as-

serted that such a system would provide flexibility of movement for all planes, have no limitations other than air space, and would automatically coordinate air traffic and maintain separations.

Self-checking communication devices, he continued, would establish continuous two-way channels between each airplane and the automatic control system and handle all routine clearance, thus freeing normal voice communication for special services. He proposed to aid navigation by using self-checking radar ground beacons affording all pilots precise holding patterns, but permitting ground control to change routings when necessary.

Air-conditioning airplanes by the installation of air turbine refrigeration was described by Bernard L. Messenger of the Lockheed Aircraft Corporation. The advantages of this system, he said, are simplicity, lightness, compactness, and a highly effective use of air as a refrigerant.

Vapor-compression cycle refrigeration, generally used commercially on the ground, was reported to be unsatisfactory for aircraft, he stated, because of mechanical complications, excessive

ACCURATE INSTRUMENTS FOR PRECISION TIMING

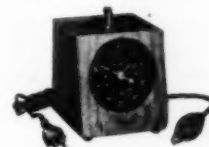


Table model electric stop clock with a-c clutch and toggle switch

The Stoelting table model electric stop clock is an accurate timer for a wide variety of industrial and laboratory tests...such as measuring start-to-stop intervals of relays and instruments, and for checking sequence operations.

Timer with a-c clutch has toggle switch for manually starting the pointer. Timer with d-c clutch has binding posts only for attaching d-c control circuit for starting and stopping the pointer. Both timers have a-c clock motors, and pointers are reset with knob.

The Stoelting electric timer and impulse counter is an accurate, dual-purpose instrument for counting individual electric impulses or for use as a chronoscope.

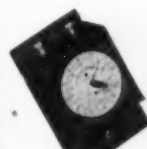
When used as timer, 11-16 v current is taken from step-down transformer. When used as counter, direct current only is used. Counter capacity — 7,200 impulses.



FREE ILLUSTRATED BULLETIN

Send for Stoelting Timer Bulletin No. 1100. Includes illustrations, wiring diagrams, technical data, and

complete information on stop clocks, chronoscopes, impulse counters, stop watch controllers, and X-ray timers.



Electric timer and impulse counter

C. H. STOELTING CO.
INDUSTRIAL DIVISION

424-H N. HOMAN AVE. • CHICAGO 24, ILL.

weight, heavy power requirements, and relatively low efficiency.

Mr. Messinger characterized as a "popular misconception" the belief of some engineers that aircraft air conditioning does not require refrigeration because planes fly at high altitudes. Passengers and mechanical equipment, he said, tend to make cabin interiors warmer than might be expected.

Science News Letter, January 5, 1946

African bongo are called the handsomest of all the antelopes.

Improved soap is possible with the use of molecularly dehydrated phosphates, it is claimed by chemists who state that such soaps will have nearly twice the cleansing power of ordinary pure soap.

NOW! Enjoy Learning to Speak

SPANISH AT HOME

FRENCH-GERMAN-ITALIAN

BIG opportunities waiting for you if you can speak Spanish! Millions of dollars being invested south of the Rio Grande—business and travel increasing every day! Now the ability to speak Spanish will mean more to you than ever before.

Only 15 Minutes a Day

Right in your own home, relaxed and at ease, learn as easily as a child learns—by listening to native instructors on these 30 NEW easy-to-understand CORTINA recordings. Every word clear as a bell. Here is the quick, easy way THOUSANDS have learned Spanish for PLEASURE and BUSINESS.

Sent on 5 Days Approval

FREE 32-page book — "The Cortina Short-Cut"—describes this famous method in detail and tells how you can TRY it in your home for 5 days. No cost if not delighted. Mail this coupon for FREE book now!



Write Today—NOW!

CORTINA ACADEMY
(Language Specialists for 60 Yrs.)
Dept. 601, 105 W. 40th St.,
New York 18, N. Y.

Please send me—without obligation—your free book. I am interested in (check)

☐ SPANISH ☐ French
☐ Italian ☐ German

Name _____

Address _____

City _____ S _____

Books of the Week

THE CHEMICAL PROCESS INDUSTRIES—R. Norris Shreve—McGraw, 957 p., illus. and charts, \$7.50. A textbook for engineers.

A FUTURE FOR PREVENTIVE MEDICINE—Edward J. Stieglitz—The Commonwealth Fund, 77 p., charts, \$1. A program for the development of preventive medicine, defined as "the attainment by the individual of optimal development and performance."

MEN WITHOUT GUNS—DeWitt Mackenzie—Blakiston, 152 p., illus., \$5. A record of the work of the Army Medical Corps, in 177 drawings and 118 full color plates by famous contemporary artists. Foreword by Maj. Gen. Norman T. Kirk, Surgeon General, U. S. Army.

MY GARDEN DAY-BY-DAY 1946—Tool Shed, \$1. A week of gardening advice and verses to each large page of this calendar, with room for notes.

SCIENCE AND SCIENTISTS IN THE NETHER-

ENGINEERING

Glass-Reinforced Plastic

► FINE GLASS fibers used to reinforce plastics, much as steel rods are used to reinforce concrete, make a plastic material with greater strength than the structural metals, H. W. Collins of Owens-Corning Fiberglas Corporation stated at a meeting of the American Institute of Chemical Engineers in Chicago. The war-developed material, widely used in military aircraft, will have many peacetime applications.

The glass-reinforced plastic material does not corrode and is dimensionally stable, he declared, and can be fabricated without costly dies. The plastics industry now has a material that can be thought of in terms of the metals and their uses, he added. It is possible that the glass-reinforced plastic may be used "for such products as railroad car, bus, automobile and truck body parts; for boats and canoes, for luggage and furniture, for piping, for kitchen and bathroom assemblies, and home appliances."

Because the low-pressure resins used in combination with the glass fibers polymerize without giving off volatiles, he explained, it is possible to cure them in any shape merely by holding them in contact with the mold. This makes it possible for manufacturers to produce very large parts, such as the whole top of a Pullman car or the hull of a boat, without the expense and physical limitations imposed by the use of high-pressure presses.

Strength properties attainable with

LANDS INDIES—Pieter Honig and Frans Verdoorn, Eds.—Board for the Netherlands Indies (Stechert), 491 p., illus. and charts, \$4.00. Technical articles dealing with the development of various branches of science in the Netherlands Indies. Although prepared by the Government of the Netherlands Indies, "the editors have attempted to keep the work free of narrow political considerations."

STORMS, FLOODS AND SUNSHINE: A Book of Memoirs—Isaac Monroe Cline—Pelican, 290 p., photographs, charts, \$3. Experiences of a meteorologist who spent over 50 years in the service of the U. S. Weather Bureau. Bibliography is included.

THE WHEATS OF CLASSICAL ANTIQUITY—Naum Jasny—Johns Hopkins Press, 176 p., illus., \$1.75. The Johns Hopkins University Studies in Historical and Political Science, Series LXII, No. 3.

Science News Letter, January 5, 1946

glass-reinforced plastics are, according to Mr. Collins: tension, 76,000 pounds per square inch; compression, 68,000 pounds per square inch; and flexure, 112,000 pounds per square inch.

Science News Letter, January 5, 1946

RADIO

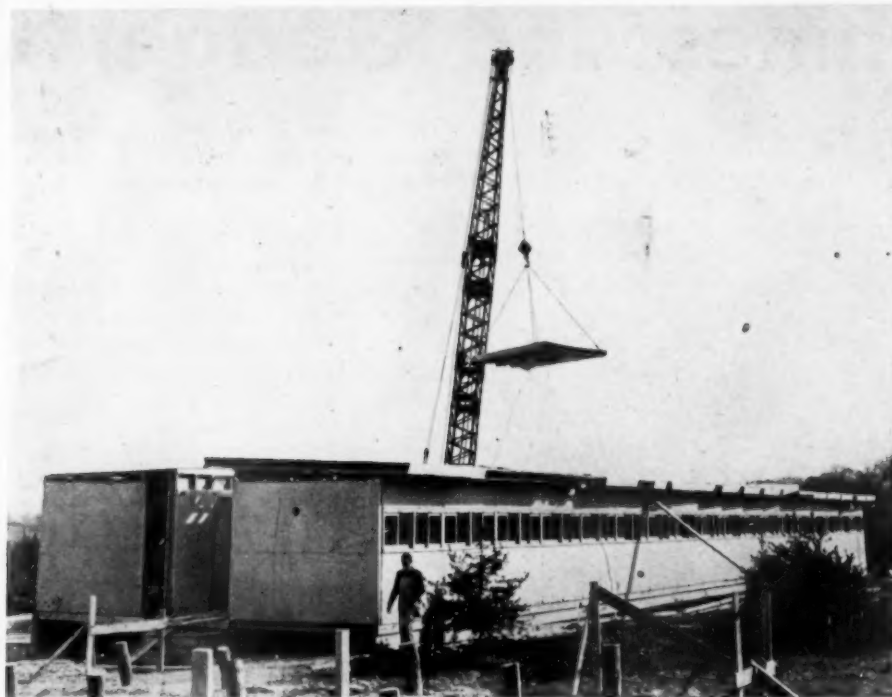
Engineer on Moving Train Talks to Yardmaster

► FIRST TRYOUT of ultra-high-frequency radio communication between moving railroad engines and control towers was made at the Wayne Junction yard of the Reading railroad, near Philadelphia. Two-way conversations were successfully conducted between the yardmaster's office and three diesel-electric locomotives moving about the yard. The principal advantage of using very high frequency waves is that they are basically static-free.

The center of the system is a 25-watt transmitter in the yardmaster's office. The locomotives are equipped with 15-watt transmitters. Tests are scheduled to continue for about three months. They are under the direction of Nelson Wells of Maguire Industries, Inc., who devised the equipment and supervised its installation.

Science News Letter, January 5, 1946

A new tobacco, low in nicotine and as aromatic as expensive Turkish products, has been developed by the University of Kentucky.



FOR VETERANS—Power crane swings roof section into place as one-story war dormitory nears completion at Federal Public Housing Authority's "War Housing Re-Use Demonstration." One section of building is being converted into family dwelling unit for temporary housing for veterans.

ENGINEERING

War Houses Converted

Units can be cut, moved and converted into dwellings for families. Demonstration will be held January 12 through February 9.

► **HOW HOUSING** units built for temporary dormitories and Army barracks can be cut, moved and converted into dwelling units for families will be shown at Silver Spring, Md., in a public demonstration that opens Jan. 12, and continues through Feb. 9.

The demonstration is particularly for state, county and city officials from various sections of the United States where such emergency housing is now available for re-use. The techniques to be shown are those found satisfactory by tests and used to meet shifting war housing needs and are now employed to meet the veterans' housing problem.

"The immediate purpose of the demonstration is to show how all possible types of war housing structures, including dormitories and barracks, may be reconstructed to provide dwelling units for veterans and their families," the

Federal Public Housing Authority states. This government agency will conduct the demonstration.

Experiments in demolition for re-assembly of war housing, which had not been intended as demountable, were conducted at several sites by the government office. The structures were of wood or frame and composition construction. The experiments showed that they could be cut into panels and moved readily and successfully. They determined practical methods of panelizing walls and roofs with a minimum loss of materials.

During the war some 10,000 units were moved, following the techniques developed, with some of the moves ranging up to 1,100 miles. Since V-J day, more than 5,000 units have been moved, or scheduled for moving, to provide emergency housing for returning veterans.

Science News Letter, January 5, 1946

MEDICINE

Spider Bite Cure May Come from Drug

► A DRUG that may turn out to be a cure for poisonous black widow spider bite has apparently been found. The drug is the synthetic chemical, neostigmine methyl sulfate, sometimes also called prostigmine.

"Dramatic and complete relief of muscle spasm and pain" came within one hour after a single dose of this chemical in a case reported by Dr. James E. Bell, Jr., intern at Roper Hospital, Charleston, S. C., and Dr. John A. Boone, assistant professor of medicine at the Medical College of the State of South Carolina (*Journal, American Medical Association*, Dec. 8).

The patient had previously suffered for five and one-half hours although the usual treatment for black widow spider bite, calcium gluconate and sedatives, had been given.

The idea of trying neostigmine occurred to Dr. Bell because this chemical is reported to have given good results in treatment of muscle spasm in infantile paralysis and rheumatoid arthritis. Muscle spasm, particularly of the abdomen but also affecting arms and legs, is the most prominent physical finding in black widow spider bite poisoning.

One recovery, the Charleston physicians point out, does not constitute proof that the treatment is a cure, but since black widow spider bites are infrequent in Charleston, they are reporting their experience for other physicians who may be called on to treat this bite oftener.

Science News Letter, January 5, 1946

YOUR HAIR and Its Care

By Oscar L. Levin, M.D.
and Howard T. Behrman, M.D.

NEW, REVISED, EXPANDED EDITION—JUST OUT! If you want healthy hair, lovely hair, then you need the expert advice in this book.

Two medical specialists have here pooled their knowledge to give you in plain language the up-to-date scientific facts now available about hair. They tell you what to do to save and beautify your hair, stimulate healthier hair growth, and deal with many problems, common and uncommon, as:

Dandruff—gray hair—thinning hair—care of the scalp—baldness—abnormal types of hair—excessive oiliness—brittle dryness—hair falling out—infection—parasites—hair hygiene, etc., etc.

Medical science is better equipped today than ever before to prevent trouble above the hair line; or should some difficulty already have arisen, to deal effectively with it.

"A worthwhile book full of important information."

—Ohio State Medical Journal.

Price \$2.00, incl. postage. 5-day-Money-Back Guarantee
EMERSON BOOKS, Inc., Dept. 540-C, 251 W. 19th Street, New York 11

• New Machines and Gadgets •

❁ **DIRECT READING spectrometer** measures electronically the concentration of elements in alloys and automatically records the results. This electronic method of measuring the intensity of spectrum lines eliminates the necessity for photographic and developing equipment and an expensive microphotometer.

Science News Letter, January 5, 1946

❁ **POWERFUL ELECTRO MAGNET**, with a maximum 4,000-pound attraction between its poles spaced one-half inch apart, has two coils of copper wire wound 6,400 times around an iron core. The enormous heat generated by the current is carried off by circulating 15 gallons of oil a minute through the coils.

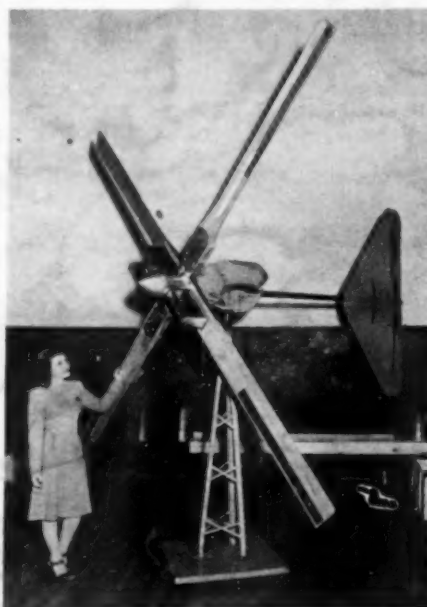
Science News Letter, January 5, 1946

❁ **MODULATOR** glow tube of the crater type, a cold cathode recorder tube that is rugged and dependable for facsimile and sound-on-film recording, is operated by the single-ended output stage of a push-pull amplifier. It provides a modulated, high-intensity point-of-light source.

Science News Letter, January 5, 1946

❁ **STIRRER-TYPE** superpressure apparatus for laboratory use operates at pressures up to 10,000 pounds per square inch and at temperatures up to 750 degrees Fahrenheit. It is available in various sizes. It is heated by an electric jacket, and its stirrer is operated by a variable-speed motor.

Science News Letter, January 5, 1946



❁ **WIND-DRIVEN** electric generator for 32-volt farm lighting system will charge storage batteries in winds as low as five miles an hour. When high winds are blowing an automatic governor turns to an ineffective angle two of the four blades shown in the picture, to prevent over-charging.

Science News Letter, January 5, 1946

❁ **ROTARY-DRILL** bit bores holes in the earth for mine shafts six feet in diameter. It can be used where the earth is composed of loose and water-saturated sand and clay. The rig is similar

to that used in oil fields, including a derrick and huge drill.

Science News Letter, January 5, 1946

❁ **EXTENSION** for half-inch electric motor shafts, called an arbor by mechanics, makes it possible to use a grinding wheel on the main shaft, and rag or wire wheels, or circular saws, on the arbor. The arbor fits well over and onto the main motor shaft.

Science News Letter, January 5, 1946

❁ **SLIDE MOUNT** for photographers' use holds a photographic slide firmly in place and permits its removal without tearing the mount. No glue, hot iron or water is required to hold the slide in position. The mount, in which the film is inserted, can be used over and over again.

Science News Letter, January 5, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 292.

Change-of-Address Coupon

In requesting change of address please give NEW address on lines below and mail this entire coupon (including imprint of old address at right) to Science News Letter, 1719 N St., N. W., Washington 6, D. C. Do this at least two weeks before change of address is to become effective. Delete an lower line of imprint at right in done your subscription expires. Please renew early to avoid missing any copies.

PLEASE PRINT

New Address

Include postal unit number, if any

Question Box

AERONAUTICS

Why are improved methods needed for airplane traffic? p. 13.

CHEMISTRY

How do glass fibers help plastics? p. 14.
What is the danger of spraying pastures with DDT? p. 5.

What new hydrogen peroxide process has been revealed? p. 5.

What steps toward the synthesis of penicillin have been announced? p. 6.

What synthetic fibers did Germany produce? p. 4.

ENGINEERING

How can an engineer on a moving train talk to the yardmaster? p. 14.

What is the best assurance against another war? p. 7.

GEOLOGY

What caused Arizona's famous crater? p. 2.

Where have fossil skeletons of giant buffalo been found? p. 3.

MEDICINE

What drug may prove to be a cure for the bite of the black widow spider? p. 15.

ORNITHOLOGY

What are quetzals? p. 8.

PHYSICS

What caused the "spurious echo" in radar? p. 9.

SAFETY

What is the probable cause of the Kentucky mine disaster? p. 2.

Where published sources are used they are cited.